NEW AMERICA

PUBLIC INTEREST TECHNOLOGY

FREEDMAN CONSULTING, LLC

BUILDING THE FUTURE

Educating Tomorrow's Leaders in an Era of Rapid Technological Change

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INTRODUCTION

In the United States, 77 percent of adults currently own smartphones—a device that debuted only a decade ago.[1] Facebook was founded in 2004, and as of 2017 claims more than 2 billion monthly users.[2] Such is the pace of technology—rapid innovation is built, scales, disrupts, and transforms entire societies in a short span of years.

Consider these shifts against the pace of public policy work. The contrast is striking. And yet there are possibly no two worlds that could benefit more from deep collaboration. From machine learning and artificial intelligence to user-centered design and cloud-based technology, technical innovation has the power to inform and to solve major public problems. Those making policy have the power to incentivize that innovation and implant it into public life, while thoughtfully addressing its potential for social impact.

This moment requires leaders in government, civil society, and industry with the capacity to harness the power of technology and to understand its social implications. Colleges and universities nationwide are producing policymakers and civil society leaders alongside engineers and web developers, but they are too often trained to serve a world in which their disciplines are discrete. Such a world no longer exists. To adequately address our most challenging social problems, we need to train public servants to think more like engineers, programmers to understand social workers, mayors to think more like designers, and product managers to understand caseworkers. This shift starts in the classroom.

To adequately address our most challenging social problems, we need to train public servants to think more like engineers, mayors to think more like designers, and product managers to understand caseworkers.

This document also starts in the classroom. It draws directly on the expertise of professors who are leading the charge to integrate technology and public challenges at the college and university level. The findings seek to understand current public interest technology programming, clarify major challenges to its implementation, and discuss potential opportunities to expand its availability. Taken together they paint a picture of a burgeoning area of study, and an opportunity to create a cohesive community of practice for those who would use technology in service of public good. With clarity of purpose, colleges, and universities can harness this moment of rapid innovation to cultivate the leaders who will build a brighter future.

EXECUTIVE SUMMARY

A burgeoning field that brings twenty-first century innovation to bear on major public problems is gaining momentum in study and in practice. We refer to this field as "public interest technology," but it involves far more than engineers and programmers. Today, public interest technology offers those who build and design technical tools the opportunity to serve social good, but it also seeks to integrate technical awareness into the processes of organizations that already work to do so. As one scholar posited, public interest technology should address both policy formation and the essential implementation of policy outcomes by government and civil society. The public policy space desperately needs technical talent to support informed approaches to tackling complex technology-related issues, like net neutrality, the use of encryption, or artificial intelligence. At the same time, organizations and governments working to serve the public good need to better integrate technical expertise to provide key services and conduct advocacy in the twenty-first century.

This collaborative approach to social innovation is generating enthusiasm among leaders in the public, private, and nonprofit sectors. But without a robust influx of talent, there will be few in positions to act upon it. Our educational system has a major role to play in developing a talent pool with the ability to integrate technology and public service, and it will require an effort that crosses traditionally siloed disciplines. This report aims to understand the current state of public interest technology education at colleges and universities and explore major challenges to its implementation. It also highlights opportunities to expand and improve these programs through interventions targeted at colleges and universities, departments, scholars, and students themselves. Findings from this report draw on 17 in-depth interviews and a day-long convening with academic leaders from a variety of colleges and universities nationwide, working primarily at engineering, public policy, information, and law schools. This report synthesizes their thinking into a concrete set of challenges and opportunities for building a more cohesive, widely-recognized field of study for those who seek to use technology in public service.

Supported by New America, the Ford Foundation, and the Mozilla Foundation, the research process informing this document surfaced promising stories of success, but also deep needs for improvements in collaboration and resourcing in order to expand the field's potential. The findings presented here seek to inform and empower college and university leaders to facilitate that collaboration and build resources where necessary.

Key Findings

The initial findings of this research paint a bright picture of a set of programs racing to embrace public interest technology in response to a growing societal need and student enthusiasm. Among our key takeaways from university practitioners:

1. **Student demand for cross-disciplinary training is increasing:** Engineering and technology students are increasingly interested in making an impact on the world and seeing the social relevance of their work. Non-technical public policy students recognize the power of technology as a tool for change. Schools report a marked uptick in demand for cross-over offerings.

2. **Practitioners are racing to respond with innovative programming:** Forward-leaning faculty and schools are meeting this demand with a wide range of creative curricular and extra-curricular offerings. Universities are offering new courses, degree programs, and entire schools devoted to subjects like data science, technology for policy leaders, and the intersection of public policy and technology. Schools are also exploring new experiential learning opportunities, from term-time apprenticeships, summer internships, partnerships with local communities, and post-graduate fellowship programs.

3. **Academic leaders are recognizing the importance of public interest tech:** At the highest levels of university leadership, there is an increasing recognition of the importance of this new field of interest, both to meet student demand and to meet the demand of the market and society.

Despite this high level of growth and excitement, colleges and universities, professors, and students all face major challenges that need to be addressed in order for them to fully realize the opportunity at hand.

This report organizes the key challenges and opportunities for growing the field according to where key gaps had the most impact: among the student body; within departments and among faculty; and at the institutional level of colleges and universities. It is worth noting, however, that key opportunities and potential interventions overlap in where and how they will need to be implemented.

Figure 1 | Student-Focused Recommendations

Student-Focused Findings: Need for stronger, more visible career pipeline

Schools are experiencing increased interest from students in studying technology and its implications for the world. Students want more course offerings, greater applied learning in the field, and clearer pathways to public interest technology careers. Colleges and universities should work to build awareness around existing career opportunities in public interest technology fields, but also seek out innovative partnerships to expand the career pipeline. They can do so by building out greater experiential learning opportunities, including internships, summer programs, apprenticeships, and fellowships. This will require introducing employers in the civil society, government, and private sectors to the value proposition of integrating students with multi-disciplinary skill sets into their teams.

Figure 2 | Departmental Recommendations

Departmental Findings: Need to increase pathways and incentives for cross-disciplinary work

College and university departments are often too constrained by administrative policies and professional incentives to provide cross-disciplinary opportunities or scholarship. Current incentive structures do not provide a sufficient pathway to professional success for college and university staff and professors who pursue the development of interdisciplinary programming. Creating new methods for giving support and recognition to post- and pre-tenure faculty who develop interdisciplinary curricula and research will help to build the public interest technology field. This may include new journals for publication, post-doctoral fellowships, regular convenings, research funding, and other avenues for solidifying the credibility and prestige of pursuing public interest technology work.

Figure 3 | Institutional Recommendations

Institutional-Level Findings: Need for greater funding, activated leadership, and increased collaboration

As the power of technology to create social change becomes clearer, many colleges and universities are starting to integrate curriculum that connects public policy and technology. Colleges and universities see a need to maintain relevance in the digital age, a burgeoning interest of students in a more holistic approach, and the evolving demands of a modernized workforce. As is often the case, funding is a challenge for developing the programming needed to cultivate the interdisciplinary skill sets needed to excel in public interest technology. To address that and other administrative challenges, deeper, more sustained activism among senior college and university leadership will be necessary. Further, greater collaboration between and among institutions both with nascent and mature public interest technology programs will facilitate a more mature well-recognized field of study writ large.

Ultimately, this research process unveiled a remarkable amount of enthusiasm and imagination among the university leaders and students currently pioneering the upstart programs in this developing field of study. While the scholars who participated in this research identified significant challenges and gaps in available public interest tech programming, they also identified concrete strategies and opportunities for unleashing the potential for modern education at the intersection of technology, policy, and society.

Summary of Approaches and Interventions

To address the needs identified in the three levels of focus above, the report details a set of potential approaches and tangible interventions for improving the availability of public interest technology programming at colleges and universities. The chart on the next page taxonomizes the interventions according to the approximate timing in which they may be accomplished and their potential level of complexity. Interventions could be implemented with different structures or intensity than envisioned here—in those cases, the timing and level of complexity would also vary. The categorical approaches for timing and level of complexity are assigned according to the following definitions:

Timing

- **Short-Term**: Interventions may be accomplished within 6 months – 1 year.
- **Medium-Term**: Interventions may be accomplished in 12 months – 2 years.
- **Long-Term**: Interventions may require more than 2 years to implement.

Level of Complexity

- **Low:** Intervention can be accomplished without substantial fundraising and partnership outreach.
- **Medium**: Intervention will require close coordination with partners OR require raising

some additional funds in order to accomplish the intervention.

- **High**: Intervention will require close coordination with partners AND require raising some additional funds in order to accomplish the intervention.

Methodology

This research is based on 17 in-depth interviews with high-level staff and faculty from a diverse set of 12 colleges and universities undertaking programming either directly or indirectly related to public interest technology. Public interest technology can be defined as the application of technical tools and thinking to solve public and social problems. Professionally, this may include a variety of actors, including computer scientists, designers, engineers, and data scientists; leaders in technology, government, and civil society; policymakers and experts; and advocates and activists. These individuals operate with some level of technological skill, understanding, or competency, and apply it to serve the public.[3]

This research focuses exclusively on colleges and universities because these institutions are most commonly the place where early career interests and exploration manifest. To build a future of public interest technology leaders, starting in the classroom is vital. High-level staff and faculty were identified both through independent research, as well as internal contacts and existing relationships. These institutions include Ivy League universities, other private universities, and state colleges and universities. This also draws on previous work documented in reports on strategies for building the field of public interest technology.[4,5]

Initial findings from research and qualitative interviews were presented at an event in New York City at the Ford Foundation in December 2017. The event convened over a dozen leading scholars at the forefront of public interest technology programming to discuss key challenges in the field and to identify tangible strategies for better supporting the expansion and improvement of public interest technology programming at colleges and universities nationwide. Outputs from the event were incorporated into the contents of this report.

A series of program profiles is provided in the appendix. This information was drawn from interviews, as well as independent desk research on select college and university programs. These profiles are not intended to provide a conclusive landscape of all college and university programming, but rather are provided to lift up select examples for additional context.

Interviewees included staff and faculty from the following colleges and universities (presented in alphabetical order):

- Carnegie Mellon University
- Georgia Institute of Technology
- Georgetown University
- Harvard University
- Massachusetts Institute of Technology
- Miami Dade College
- Princeton University
- Stanford University
- SUNY Stony Brook University
- University of California, Berkeley
- University of Chicago
- University of Michigan

Table 1 | Summary Chart: Student-Focused Findings

Approaches	Interventions	Timing	Complexity
Implement new approaches to experiential learning	Term-time programs	Short-term	Medium
	Community-based research projects	Short-term	Medium
	Departmental clinics and labs	Medium-term	Medium
	Formal certificates and micro-credentialing programs	Long-term	Medium
Support cross-disciplinary student cohorts	Non-degree granting hubs	Long-term	High
	Student-run groups and organizations	Short-term	Low
	Cohort network	Long-term	High
Market career pathways to students more effectively	On-campus career fairs and online job boards	Short-term	Low
	Expert speaker series and panels	Short-term	Low
	Explore connecting tech students to existing fellowship and volunteer programs	Medium-term	Medium
Establish sectoral partnerships and financial aid programs for internships, fellowships, and careers	Private company sponsorships	Long-term	High
	Sectoral partnerships	Long-term	High
	Scholarships and other financial aid programs	Long-term	High

Table 2 | Summary Chart: Departmental Findings

Approaches	Interventions	Timing	Complexity
Garner post-tenure staff support and mentorship to activate pre-tenure staff	Targeted post-doctoral research positions	Medium-term	Medium
	Provide co-teaching opportunities with tenured staff	Short-term	Medium
	National mentor network	Medium-term	Medium
Create opportunities for pre-tenure staff to conduct interdisciplinary instruction and research	Implement a gold star program for faculty and staff	Short-term	Low
	Develop an interdisciplinary standard for tenure	Long-term	Medium
	Create public interest tech-focused journal(s)	Medium-term	Medium
	Offer national awards	Short-term	Medium

Table 3 | Summary Chart: Institution-Level Findings

Approaches	Interventions	Timing	Complexity
Create a community of practice	Convene regular college and university practitioner meetings	Short-term	Medium
	Host sponsored events or conferences	Medium-term	High
	Develop formal communication channels	Short-term	High
	Support local higher education consortiums	Long-term	Medium
Engage and activate leadership	Sign and promote public interest technology pledge	Short-term	Medium
	Establish linkages to current events and community movements	Short-term	Medium
	Tap tech leadership to champion public interest technology	Medium-term	High
Use creative approaches for increasing targeted and general support funding	Pursue possible linkages to adjacent funding within colleges and universities	Medium-term	Medium
	Explore new channels for funding	Long-term	High
	Pursue dedicated funding for innovative interdisciplinary funding	Medium-term	Medium
Uplift models and best practices as tools to promote effective replication of college and university programs	Create an interactive web portal for knowledge-sharing and best practices	Medium-term	Medium
	Develop and share helpful funding models for sustainable programming	Medium-term	Medium
	Create roadmap to administering interdepartmental program development	Short-term	Low

STATE OF PLAY

Practitioners and scholars at colleges and universities across the country are pioneering innovative public interest technology programs with both excitement and urgency. In the same way that the creation of "public interest law" in the 1960s built the now-obvious linkages between legal practice and pressing civic problems, the importance of technological innovation is revealing similar connections between technology and public good that demand further attention to "public interest technology." Today, colleges and universities across the country are beginning to creatively think about the relationship between technology and public service to build a future of leaders equipped to change the world, a future of public interest technologists.

Excitement from Scholars and Students about Progress

Conversations with leading scholars and practitioners revealed a great deal of excitement from faculty and students around public interest technology on campuses. Scholars from a diverse sampling of colleges and universities described an explosion of interest among students, who are keen to identify the growing relevance and linkages between technical skills and education to broad social problems. Today, there is major experimentation happening in the field; however, it is largely happening on an individual basis, within singular departments, or at the single professor or student group level. While rightfully elevating their many successes, scholars and practitioners emphasized that this was just the beginning, and that there is a great deal of work ahead.

Plenty of Obstacles and Challenges Remain

Building public interest technology into a recognized field of study requires addressing obstacles at multiple levels. At the institutional level, major strides are needed on provost support, college- and university-wide funding, and resource allocation for public interest technology education. To this end, there is a desire to see college and university leadership engaged. Further, departments must address the supply of faculty and staff with the ability to teach a public interest technology curriculum. Finally, for students to pursue this work seriously, there must be more formal avenues for academic and professional progress in public interest technology, including an intuitive career pipeline to civic organizations and government agencies.

Much has been done already to begin addressing these obstacles, but more work remains. A unified, collaborative network in academia could help to ensure that the next generation of emerging talent is successfully directed toward skills and opportunities to serve the public interest.

STUDENT-FOCUSED FINDINGS

Increasingly, students across disciplines are seeking work that is mission-driven and meaningful. From engineering and computer science students to law and public policy students, emerging talent and the leaders of tomorrow want to change the world. Connecting students to learning and professional opportunities solving complex, twenty-first century public problems is both vital and desired.

This section examines findings and key insights on challenges to promoting both a supply of student body interest in public interest technology programming, as well as the supply of professional development and careers in public interest technology work.

Challenges and Gaps

Lack of Professional Opportunities in the Field

> **"Before you get students interested in pursuing those careers, you have to convince the organizations that they need to be hiring technologists. Positions that are created are rarely crafted in a way that aligns with or attracts interested students."**
>
> *— Lorrie Cranor, Carnegie Mellon University*

Compared to opportunities in the private technology sector and traditional public policy roles in the civic and social sector, few opportunities are available to recent graduates to pursue public interest technology work, interviewees said. Students often express initial interest in this work, either through coursework or extracurricular activities, but faculty are less certain on which direction to point them in for professional development and career opportunities.

Nonprofits are often seen as having a lack of understanding on how to use technologists effectively in their organizations. Scholars noted that nonprofits hiring for technologists may get hundreds of applications from interested students for one opening. When technologists work at nonprofits, some face a lack of mentorship that fosters skill-building and learning around technology skills, some interviewees suggested. Additionally, pathways for mobility for a technologist in the civic and public sector were less certain or clear. For instance, many scholars noted that while emerging talent can often find fellowships, internships, and entry-level positions in technology roles in the civic and public sector, charting course through mid- to senior-level positions at the same organizations and agencies was a much bigger challenge. Additionally, government agencies are less adept at hiring technology talent, often providing job descriptions that lack an appeal to the right kind of talent.

For example, one interviewee noted that many privacy-related jobs ask for engineers with more than ten years of privacy engineering experience, a qualification that, practically speaking, doesn't currently exist. Rather than hiring younger talent who are well-trained in privacy, these companies tend to settle for older engineers with traditional security credentials. This creates a challenge for emerging talent that have studied the latest thinking on the topic.

These obstacles and limits make energizing students around technology careers in the public interest a challenge. In addition to interventions targeting colleges and universities on the "supply side" of the public interest technology pipeline explored in this report, efforts to improve the "demand side" will be vital, interviewees suggested. Ensuring that students have access to a variety of opportunities that provide instructive, experiential learning and skill-building—both in and out of the classroom—will raise awareness to potential career opportunities in public interest technology.

Competition with Private Sector Opportunities and Prestige

> **"Tech education can be a way out of poverty. These students are well-positioned to serve their communities because they intimately understand the needs, but this is in tension with their need to help their families financially."**
>
> *— Kelly Dowling, SUNY Stony Brook University*

In discussing career pathways for college and university students, particularly engineering and computer science majors, private industry and technology companies were characterized as having a large presence at campuses and at career development events. Major companies such as IBM, Microsoft, Salesforce, Google, and Apple largely overshadowed nonprofits, civil society organizations, and government agencies.

Recruiting pitches at major technology companies paint a picture of careers as a part of something large-scale and change-making in Silicon Valley to prospective talent, all with a competitive salary, benefits, and other notable perks.

The reality is that the meager salaries for public interest work make it untenable for many students, particularly those from lower-income backgrounds. As one professor noted, public interest work could often be "a rich man's game." Kelly Dowling, assistant dean for Advancement at SUNY Stony Brook University noted, "For many, public interest careers translate to smaller salaries. This is a challenge for 40 percent of our students that are first generation and may need to support their parents. Tech education can be a way out of poverty. These students are well-positioned to serve their communities because they intimately understand the needs, but this is in tension with their need to help their families financially."

Interviewees noted that the civic and public sectors faced difficulty both in funding new internships, fellowships, and professional development programs, and in continuing to support existing early-career opportunities in public interest technology. Effectively securing partnerships, funding support, and other subsidies will help to maintain competitiveness with the private and technology sector.

Lack of Formal and Effective Access to Knowledge of Existing Opportunities

> **"While there may be no substitute for personal connection, it could be helpful to have a formal program funding summer jobs. That would get people on the track to full time careers in these areas."**
>
> *— Susan Crawford, Harvard Law School*

Students that become interested in public interest technology often do so through one good professor

or an informal suggestion that sparked lasting interest. There is a notable need for a more formalized, robust structure for raising awareness for, and connecting students to, opportunities in public interest technology work.

In describing job prospects for her students, Susan Crawford at Harvard Law School noted, "A student in my class met someone with City of Boston, got a job in the city, and now works there. Awareness to opportunities is often developed through informal connections. While there may be no substitute for personal connection, it could be helpful to have a formal program funding summer jobs. That would get people on the track to full time careers in these areas."

Of the opportunities that do exist, few are lifted up through professional and career development services at colleges and universities. Further, public interest opportunities, for all their rarity, have far fewer perks and less competitive compensation than those in the private sector, presenting a barrier to entry for low-income students. Scholars characterized students as wanting meaningful, mission-driven work, but lacking a clear pathway to finding that work in the public and nonprofit sectors.

Recommendations for Improving/ Expanding the Field

Implement New Approaches to Curricular and Experiential Learning

> **"Many students have built teams within the college to perform a variety of service initiatives for the community, including literacy programs and natural disaster relief. They also participate in internships through the Mayor's office and other public officials."**
>
> *— Maria Chicuén, Miami Dade College*

It was frequently noted that public interest technologists often fell in love with this field through a single compelling class or exciting internship opportunity. In order to improve the quality of public interest technology education and training at colleges and universities, these institutions should push to better define and operationalize effective programming. This should involve the deep socialization of technically-inclined students to policy thinking, as well as socializing public policy and legal students to systematic technical thinking.

In addition to exploring models discussed elsewhere in this paper, colleges, universities, and their academic departments could consider the following creative interventions to embed cross-disciplinary programming to better support student interest. (See Figure 1) These could include:

- **Term-Time Programs**: Many colleges and universities offer semester programs or funded trips to Washington, D.C. for policy-oriented students. Some of these programs provide internships and other opportunities to meet and hear from leading figures in government and politics. Colleges and universities should consider how to develop a similar term-time program that connects emerging public interest technologists at their colleges and universities to those already working in the field.

- **Community-Based Research Projects**: Students with traditionally technical backgrounds in fields such as engineering or computer science could be paired with community organizations doing civic and social work and help them define and address a technical problem. This practicum could be a co-curricular opportunity, or a degree requirement for all students that would provide them direct experience in the social, political, legal, and ethical implications of their technical skills that they may not be getting in the classroom.

- **Departmental Clinics and Labs**: Colleges and universities could create opportunities for clinical lab work in public interest technology research. By developing discrete spaces dedicated to interdisciplinary research, college and university departments can help to connect classroom instruction, curricula, and interested students to applications of public interest technology. Laboratory infrastructure and research grants could be funded through institutions such as the National Science Foundation (NSF).

- **Formal Certificates and Micro-Credentialing Programs**: To enhance the demand for public interest technology students among employers, colleges and universities could explore developing and launching certificate programs or micro-credentials in cross-disciplinary programs. Programs could be piloted in partnership with a college or university's engineering school and public policy school, along with a public interest or private sector employer who would connect with institutions on the utility of the curriculum. This non-degree credentialing could present a lower-lift administrative option for formalizing the cross-disciplinary skill set and its relevance to potential employers. Programs could be endorsed publicly by sectoral partners, including private technology companies, to lend additional legitimacy and prestige.

Colleges and universities should work to better understand best practices and models for effective interdisciplinary programming, working with peer colleges and universities and programs to identify and elevate strategies and frameworks for appropriately educating students in public interest technology.

Support Cross-Disciplinary Student Cohorts

To ensure that emerging public interest technology talent is being supported with resources and opportunities early and often, scholars have noted the potential utility in building and supporting cohorts for students engaged in this work. A cohort could be comprised of a handful of students from across disciplines exhibiting interest in, and talent for, using technology to solve public problems.

To supplement classroom instruction, student cohorts could be provided with additional co-curricular or experiential learning opportunities to further build experience and knowledge in the field of public interest technology, including mentorship, research grants, and other career development resources. Additionally, students would be provided a space for peer-to-peer learning, engagement, and information sharing. Some potential interventions for supporting co-curricular cohorts are:

- **Non-Degree Granting Hubs**: Colleges and universities could designate a space—either physical or virtual—to promoting the cross-training work of equipping students with civic and/or technical skills to do public interest technology work. This hub could coordinate both curricular and co-curricular opportunities for advancement in the field. Staff from multiple departments would agree to open their doors and assist with various types of training. These hubs could provide regular programming opportunities, speaker series, boot camps, and community opportunities for interested students.

- **Student-Run Groups and Organizations**: Colleges and universities could support the creation of student run groups, clubs, or organizations to connect and further expose students to public interest technology. These organizations could operate independently of course curricula or integrate with it, and could provide space for students to engage with likeminded peers. Additionally, student-run groups and organizations could help to connect students to information, resources, and other research and career opportunities in public interest technology.

- **Cohort Networks**: A network of cohorts from different colleges and universities could be connected to further strengthen information-sharing and peer-to-peer learning. These cohort networks could be local, statewide, or national, and could be organized by issue area. For instance, a cohort of public interest engineers could communicate and interface regularly from across the country, while a cohort of technology policy scholars from institutions throughout the city of Boston could meet regularly to discuss projects. Meetings could be held virtually or in-person.

Market Career Pathways to Students More Effectively

> **"We need to make in-roads for students early on in the process. It's hard then to swoop in senior year and get them interested in this type of work. There needs to be some kind of educational campaign early on."**
>
> *— Alvaro Bedoya, Georgetown University Law Center*

Scholars recognized that there was a general lack of effective communication, messaging, and storytelling around potential careers in public interest technology. Improved branding and articulation of existing careers, as well as building new ones, will be integral to linking excellence with public interest technology's mission-driven values.

Colleges, universities, and their academic departments should consider the following strategies for better communicating career pathways and possibilities to students.

- **On-campus Career Fairs and Online Job Boards**: Faculty from traditional computer science programs described career fairs and other professional development mediums as saturated by large technology companies. Injecting these resources with agencies, organizations, and other professional opportunities in the civic and public sector could help to increase their overall visibility. (Accomplishing this goal may require direct outreach or curation efforts). In addition, an online job board developed and maintained by a consortium of colleges and universities could specialize in aggregating and posting internship and early career opportunities in public interest technology.

- **Expert Speaker Series and Panels**: Increasing the presence of voices from the public interest technology field on campus could help bolster the field's visibility. This could be achieved through inviting high-level technologists from the civic and social sector to participate on panels and give talks to tell real-world stories about, and help raise awareness to, the variety of non-traditional careers in technology available to emerging technologists.

- **Explore Connecting Tech Students to Existing Fellowship and Volunteer Programs**: Currently, top students and recent graduates from around the country looking to engage in public service and civic volunteer opportunities are rewarded prestigious fellowships and placed in volunteer programs such as Peace Corps, the Fulbright Program, and AmeriCorps. Connecting STEM students with traditional engineering and computer science backgrounds to these programs could help to support and fulfill interest in public interest-related work, prompting future career ambitions in the field. More research could help to identify how existing fellowships and volunteer programs could apply student technical skills in their work in communities both domestic and abroad.

Establish Sectoral Partnerships and Financial Aid Programs for Internships, Fellowships, and Careers

In order to create viable and appealing pathways to careers in the public interest that compete with private and technology sector companies, interviewees noted the need for partnerships that could help to promote access to opportunities, particularly from underrepresented communities. Potential strategies for developing opportunities through partnerships, sponsorships, and other programs include:

- **Private Company Sponsorships**: Sponsorships could be developed in partnership with a private sector company through subsidizing, funding, or supporting paid internships or fellowships with nonprofit organizations or government entities. One potential strategy would be to partner with key corporate social responsibility initiatives tied to local communities and education to connect students to technical problems in their communities through local civic organizations. Another strategy could be to get commitments from technology companies to encourage entry-level technologists—such as engineers, designers, or product managers—to perform a tour of duty at a government agency or nonprofit for a finite period of time.

- **Sectoral Partnerships**: Some college and university programs described partnerships with local community organizations and nonprofits as a means to connect students to applied opportunities in public interest technology. Colleges and universities should consider how to better create, support, and expand partnership opportunities with civil society organizations at the local, state, and national level as a cost-effective way to give students invaluable research and career development opportunities. In turn, local community organizations will receive cost-effective services from skilled technologists without having to hire additional staff.

- **Scholarships and Other Financial Aid Programs**: Colleges and universities should consider directing dedicated funding to promote scholarships tailored specifically to students pursuing academic study in public interest technology. Another potential avenue could be the creation of loan-forgiveness programs for STEM students going to work in the civic and social sector. Currently, the federal government through the Office of Personnel Management (OPM) provides student loan repayment programs for agencies as a tactic for talent recruitment.

R. David Edelman at MIT also emphasized the important role tech companies could play in supporting students. He suggested, "Corporate social responsibility (CSR) at major technology companies should think about sponsoring student fellowships or internships. For example, if a student comes out of MIT, Google could fund them to go into a public interest tech job. This could lend prestige and incentives to interested parties." Examining models like these and others could help to develop new and innovative ways, either through engaging governments, foundations, or other actors, to help better incentivize students to work in the public interest.

DEPARTMENTAL FINDINGS

While institutional support is vital for public interest technology programming to succeed, it is departments, scholars, and professors who must meet the challenge. This research found clear energy among interviewees as well as a number of successful models, but also significant obstacles that practitioners in the field face to expanding their work. This section provides key findings and insights on the major obstacles to building a faculty infrastructure around public interest technology programming. Key opportunities and strategies for better supporting and building a healthy infrastructure are detailed below.

Challenges and Gaps

Lack of Clear Public Interest Technology Models

Many of the challenges to promoting a rigorous, cross-disciplinary curriculum were identified at the faculty and staff level. Due to competing pedagogic styles, properly integrating technical degree programs—such as computer science and engineering—with public policy and government programs was characterized as a difficult feat, especially for a single scholar or small group.

Scholars agreed that engineering and computer science students could benefit greatly from adopting a social, political, legal, and ethical lens for their research and studies. However, they noted, traditional departments are often hesitant to use case-based tools, examples, hands-on projects, and other applied learnings related to the public interest in their course curriculum. Some engineering courses may provide training on crisis management tools for civic problems like natural disasters or power outages, but rarely are they applied as positive social tools with preemptive implications for far-reaching civic problems. Overall, scholars noted a difficulty in both demonstrating the value of and applying social, policy-oriented thinking within a traditional curriculum. Similarly, scholars agree that having a toolkit of technical tools, skills, and modes of thinking is integral to modern policy analysis and public service. Today, some work is being done to create mini-disciplines or discrete skill-building opportunities within existing degree programs. Despite this, many public policy programs were found to inadequately integrate skills such as data science and computational techniques in their programs.

There was little consensus by scholars across the board on the best approaches or structures for a cross-disciplinary education in public interest technology. Some noted that having a public policy education with one year of tech policy study is ineffective, calling it a decontextualized tech policy education and “a waste of time.” Others noted the

potential benefit of splitting the field out into sub-disciplines: one focused on building technology and applying tech-thinking to implementing policy and practice, and another focused on applying public policy analysis to issues of tech services implementation. A standardized theory for how to effectively conduct cross-disciplinary programming was lacking.

In the case of programming at junior or community colleges, where student time and resources are limited, cross-disciplinary education becomes an even greater challenge. With some students working part-time, there is an increased need to find innovative ways to be time-effective with course offerings. Equipment for technology education can be expensive, creating an additional obstacle in expanding the reach and scope of technology and technical education into other disciplines.

The Tenure Problem

> **"The problem stems largely from academics and faculty focused more on research than teaching. Connecting the research more to community impact or demonstrating how the applied learning can be a boon rather than a barrier to findings could help to make interdisciplinary work more palatable."**
>
> *— Scott TenBrink,University of Michigan*

In the early stage of their career, scholars on a pre-tenure track at colleges and universities are often encouraged to select a singular focus in their work that is grounded in one department or academic discipline. This focus inhibits academics from building a body of experience specific to the cross-cutting challenges of public interest technology, restricting the supply of available academics and researchers with expertise in this emerging field.

Ed Felten of Princeton University described this challenging incentive structure. He noted, "Pre-tenure people at highest-ranked schools are focused on getting tenure, so the safe way to do that is to pick one thing and excel at it. After getting tenure, it's a lot easier to branch out, create your own field, and do interdisciplinary work. Common advice given to junior people is to not do too much interdisciplinary work as it tends to not be recognized in the same way. We need to create ways for pre-tenure individuals to do this work."

In particular, academic journals and other mediums for publishing work, which form the basis by which scholars achieve prestige and build personal brands, have less appetite for interdisciplinary research. Many of the resume-boosters and paths to accolades in academic life run counter to the pursuit of interdisciplinary research, interviewees suggested.

For tech-focused academics and practitioners specifically, traditional engineering and computer science programs often reward the building of groundbreaking technological innovations, while civic and public interest work often emphasizes the need to reduce technical risk for implementation by applying known tech solutions to a problem. Thus, applied tech provides far fewer opportunities for publication in academic journals valued in the tenure process, and fewer clearly available pathways to positions with prestige. As Scott TenBrink of the University of Michigan put it, "While there is an effort to dis-incentivize (applied tech) work, the problem stems largely from academics and faculty being focused more on research than teaching. Connecting the research more to community impact or demonstrating how the applied learning can be a boon rather than a barrier to findings could help to make interdisciplinary work more palatable."

These rigid structures work against emerging academics and pre-tenure staff members interested in interdisciplinary fields like public interest technology. Departmental leadership should aim to attract faculty and staff eager to explore cutting edge and exciting challenges at the intersection of public interest and technological innovation.

Lack of Faculty Able to Teach Multiple Disciplines

> **"The fact of the matter is it's hard to find those people who can credibly teach both technology and public policy in a cohesive, robust way. These people are unicorns."**
>
> *— Deirdre Mulligan,University of California at Berkeley*

Many faculty members were characterized as lacking the tools and capacity to implement a cross-disciplinary curriculum that adequately combined innovative technical skill-building with rigorous public policy education. Team teaching, with teachers from different disciplines jointly teaching a course, has been implemented with some successes, though other interviewees noted overall that it was resource-intensive and difficult to execute in practice.

Finding faculty with the right balance and interest between two or more disciplines was difficult. As one interviewee noted, for example, professorial leadership in computer science often comes more from achieving breakthrough theoretical research within new frontiers and less from achievements in applying existing research to solve new problems. Additionally, interviewees with a strictly legal or government background noted an inability to adequately provide instruction to students on applied technical training. While these disciplines are symbiotic in practice, the prevailing academic culture makes theoretical integration in a classroom setting somewhat challenging.

Recommendations for Improving/ Expanding the Field

Garner Post-Tenure Staff Support and Mentorship to Activate Pre-Tenure Staff

Interviewees emphasized that the incentive structures for pre-tenure faculty (such as an emphasis on publishing in existing journals and a relatively low weight placed on classroom instruction) were not well-aligned with strengthening the intersectional, emerging public interest technology discipline. As a result, activating post-tenure professors to advocate for, support, and help build momentum around public interest technology programming is crucial to cultivating broad support, and for empowering future generations of intrepid, cutting-edge scholars and instructors to pursue research in the field.

Departments could pursue the following interventions for acquiring and generating post-tenure air cover and mentorship for cross-disciplinary programming. (See also Figure 2)

- **Targeted Post-Doctoral Research Positions**: One potential strategy could include creating positions for Ph.D. students to work as postdoctoral researchers for a known academic expert in the field of public interest technology for a fixed period of time. This paid position would provide mentorship, deeper engagement with public interest technology as an academic discipline, and a path for post-doctoral candidates to segue into a career in the civic and public sectors.

- **Provide Co-Teaching Opportunities with Tenured Staff**: While pre-tenured staff are pressured to specialize, tenured staff have the relative freedom to branch out and conduct interdisciplinary studies. Colleges and universities could consider pairing pre-tenured professors with tenured professors from different disciplines to co-teach courses with interdisciplinary curricula.

- **National Mentor Network**: In order to create space and opportunities for mentorship, colleges and universities could work together to formalize a network that connects Ph.D. or post-doctoral candidates to seasoned experts in the field of public interest technology. Effectively pairing emerging scholars with existing post-tenure experts could help to

provide career support and delineate pathways to ongoing interdisciplinary research and writing opportunities.

Create Opportunities and Incentives for Pre-Tenure Staff to Conduct Interdisciplinary Instruction and Research

> **"We need to be able to give people impressive stuff to put on their resumes. This may include creating new or easier paths for people publishing work, or national awards. The field and its work has to be recognized as prestigious and sought-after to help create the idea that this is a tangible field."**
>
> *— Ed Felten,Princeton University*

To make this field more viable for pre-tenure faculty, values, such as prestige, institutional commitment, incentives, reputation, abundant resource allocation, and a path to promotion could be embedded into existing programming.

Departments could undertake the following interventions for creating more opportunities for public interest technology research, thereby lending the discipline greater recognition and prestige, showing their institutional commitment, and making it a more viable choice for emerging pre-tenure faculty.

- **Implement a Gold Star Program for Faculty and Staff**: Departments could implement a gold star program that regularly rewards and recognizes faculty achievements in promoting and integrating public interest technology programming into research and instruction. Gold stars could be accompanied by additional rewards, including greater funding, grants, and other resources for continued research and instruction around public interest technology.
- **Develop an Interdisciplinary Standard for Tenure**: In collaboration with established institutions such as the American Association for University Professors (AAUP), develop a standard that college and university leadership can use to reward innovative professors who engage in interdisciplinary work with tenured appointments.
- **Create Public Interest Tech-Focused Journal(s):** Colleges and universities, along with other research institutions could launch and support new, well-respected mediums, such as academic journals, for scholarship in public interest technology. Providing institutional structures for pursuing interdisciplinary work may help to generate a critical mass of academic research and interest in public interest technology, improving its credibility and importance as a field of study for students to pursue.
- **Offer National Awards**: A highly visible national research award for graduate, doctoral, and post-doctoral candidates in the field of public interest technology could help to identify and champion existing efforts by non- or pre-tenure scholars in the field.

By creating credible, well-respected journals, publications, awards, standards, and other mediums for rewarding and showcasing interdisciplinary research, institutions can provide meaningful air cover to students, postdoctoral candidates, and pre-tenure faculty to pursue serious research in public interest technology-related fields.

INSTITUTIONAL FINDINGS

This section will detail findings on the challenges and gaps in promoting college and university programming at an institutional level through high-level leadership, department heads, and provosts. To address these challenges, this section will describe several concrete approaches to garnering institutional support. These approaches can help to build excitement and interest for the field of public interest technology from the top down, helping to inject needed institutional support and grow programming at colleges and universities.

Challenges and Gaps

Vision for the Field Still Emerging

> **"As much as possible when regulators are in town, I try to curate a set of briefings that will provide useful information from scholars, and university leaders to inform regulator work, and to academics about issues regulators are exploring."**
>
> *— Deirdre Mulligan, University of California at Berkeley*

Scholars working to implement programming that integrates technology into public interest work provided strong visions for their individual programs, but warned of a lack of clarity around priorities and needs for the field of study writ large. While some common challenges and needs were identified, most interviewees acknowledged the lack of a cohesive vision across and within colleges and universities for the long-term needs of public interest technology education. Chief among the reasons for this challenge, interviewees noted, was that while they reached out to colleagues informally, very little communication occurred on a regular, formalized basis around shared principles, goals, curricula, and strategies.

This lack of cohesion is due in part to deep siloing both within and among institutions. Many scholars characterized communication with colleagues as loose, irregular, and often informal, noting a low capacity for information-sharing. As colleges and universities vie for recognition as a unique and elite program, sharing their best practices and methods was often considered less than palatable. When peer colleges and universities did communicate and collaborate in a formal setting, it was often at the behest of a common funder or foundation. Beyond this, information sharing was largely ad hoc, requiring self-motivated scholars willing to develop and share programmatic needs and resources using their individual time and resources. As Deirdre Mulligan of the University of California at Berkeley noted, "As much as possible when regulators are

in town, I try to curate a set of briefings that will provide useful information from scholars, and college and university leaders to inform regulator work, and to academics about issues regulators are exploring." That ability to curate is fully dependent on individual professors maintaining relationships and taking the initiative.

> **"Part of the challenge is that this is a niche field, and there aren't too many people bought in at a strong level. There are a couple spread out at universities, and some talk to each other, but it's not as comprehensive as it could be."**
>
> *— Mark Guzdial, Georgia Tech*

Despite this challenge, many saw value in talking with other programs more regularly and formally. Some had in fact attempted to develop more formal efforts at communication with limited success. Mark Guzdial of Georgia Tech, in describing a network of professors funded by the National Science Foundation to conduct workshops around interdisciplinary programming, said of efforts to coordinate professors more formally, "We have a mailing list ... [but it] doesn't generate a lot. There is a website where you can get curriculum ideas ... but it gets very few contributions. Part of the challenge is this is a niche field, and there aren't too many people bought in at a strong level. There are a couple spread out at colleges and universities, and some talk to each other, but it's not as comprehensive as it could be."

A standardized and regular network of communication and information sharing could serve to improve college and university programming practices broadly around public interest technology. Lessons could include how to better direct existing funding or generate new funding, program and curriculum development and best practices, and creating new and innovative pathways to professional and career development opportunities for students.

Improving communication and coordination could align a broad vision for public interest technology as a discipline. As Brett Goldstein of the University of Chicago noted, "We don't explain this area of work well and don't make the effort to do so. When I take the time to introduce interested students as to what data science can do to solve social problems, they get it. If we had improved capacity for outreach and communications, we could get more people doing this."

Lack of Funding

> **"We need funds to take this to the next level. Right now we rely on partnerships with Bay Area nonprofits to help support student capstone projects in the field. More direct funding would help make projects and research more flexible."**
>
> *— Deirdre Mulligan, University of California at Berkeley*

A greater need for funding to support effective public interest technology programming was noted almost unanimously among interviewees. Current funding often remains siloed within existing disciplinary structures in discrete departments, and additional support for new, cross-disciplinary approaches, such as public interest technology, is often hard to find. Without greater funding, capacities and resources at departments, centers, and institutes are often stretched. This shortfall makes it even harder for departments and centers to support undergraduate and graduate students. Greater targeted and general support funding is integral to increasing administrative and staff capacity, as well as better supporting fellowships, research grants, and other resources for strengthening public interest technology as a viable choice for students.

Some programs identified savvy strategies to work around low amounts of funding. For instance, while one university could not independently

> **"The major catalyzing element for the program was obtaining a new dean … [who cared] deeply about the importance of technology and digital thinking for the future leaders of government. It all starts from the top."**
>
> *— University Professor*

fund internship or fellowship programs at select organizations, they were able to facilitate partnerships between local nonprofits and master's student capstone projects to give students hands-on experience solving real-world technical problems. Despite these innovations, greater overall funding would grant programs more options and flexibility in connecting their students to learning and professional opportunities. A more sustained funding structure for college and university programming could help institutions provide such supports as improved administrative and staff capacity within departments and programs, better co-curricular opportunities for independent student projects and research, and career development opportunities, such as fellowships and internships with partners in the civic and public sector.

Need for Leadership to Champion Innovative Work

> **"While leadership has been useful in promoting interdisciplinary programming through a variety of new institutes and centers, the university is largely characterized by siloed departments and schools."**
>
> *— Scott TenBrink, University of Michigan*

Interviewees often cited the level of interest in cross-disciplinary programming that provosts and other college and university leaders exhibited as a large determinant of the potential for that programming to succeed. Many key organizational needs—from funding allocations to college and university resources—are promulgated from the top, particularly when non-traditional support is needed to get new programs up and running. High-level actors at colleges and universities can also lend credibility to programs, helping to imbue them with prestige that will then attract scholarly talent and student interest.

The academic culture within existing departments and programs also often lacks flexibility. For public policy programs and schools, pedagogy is often grounded in theoretical learning and concepts. One scholar described a major disconnect between the appetite for cross-disciplinary study among students and the willingness of college and university leadership to engage with it.

The culture in traditional computer science and engineering programs often was described as similarly rigid. "Engineering school is hard to crack. They are very academic in their approach, rigid in their course requirements, and often hesitant to do applied work that expands into areas like local government," one scholar noted. Scholars described attracting interest from colleagues working in these programs as challenging. This was largely due to a relative pressure to specialize in a discipline and produce new research on that technology rather than focusing on the application of existing technology to public problems.

Recommendations for Improving/ Expanding the Field

Create a Community of Practice

Finding useful, strategic ways to regularly connect practitioners across the country to share lessons learned, curricula, and strategies for improving programming could help to build a more robust, widely recognized field of study. A cohesive ecosystem of practitioners with a formal community of practice will help create credibility, visibility, and

"Building a network of universities, with support from organizations across sectors, can help us to assess the academic curriculum and instruction methodologies while developing experience in public service. It could also provide opportunities to attend or convene forums throughout the school year on topics that are relevant to the public service coursework."

— Maria Chicuén, Miami Dade College

prestige. As one scholar noted, "Establishing this as a recognized and respected field will be helpful in making the case that this is a real career you can have." This will help to drive up interest and demand from students over time. Additionally, it will help to convey the importance of the field for all sectors, helping to stimulate the supply of career opportunities broadly.

A community of practice that is formal, visible, and recognizable within academia provides space for those interested in public interest technology programming—from provosts, scholars, and students, to philanthropy, private industry, and government—to convene and share information with peers. Community resources could include either a web portal or other medium through which information and resources around public interest technology education could be accessed and disseminated more broadly. For example, lawyers who wish to serve the public interest have a formally recognized field which has developed formally recognized resources, including the Public Service Jobs Directory, dedicated foundations, national organizational networks, and widely circulated guidance for students.

Strategies for ongoing development of such a community for public interest technology could include the following. (See also Figure 3)

- **Convene Regular College and University Practitioner Meetings**: An annual or semi-annual meeting of college and university leaders to discuss programmatic progress, lessons learned, future planning, and strategies for success with peers. This would also help to ensure that relationships between programs are fostered and maintained.

- **Host Sponsored Events or Conferences**: Regular nationwide conferences that bring together students, scholars, private sector leaders, and civic leaders to share information and elevate major successes. This could help to highlight ongoing best practices in program and curriculum design and administration, and provide a space for potential partnerships and collaboration with other colleges and universities, private industry, philanthropy, and government.

- **Develop Formal Communication Channels**: Regular maintenance of email listservs, newsletters, or a private Slack channel for scholars and college and university leaders to frequently and formally communicate updates, questions, and lessons in real time.

- **Support Local Higher Education Consortiums**: Currently, some institutions of higher education facilitate local consortiums of peer institutions to share information, resources, and academic and professional opportunities related to a particular field. Local consortiums around public interest technology could be built and maintained in cities and regions nationwide to share information, strengthen programming, and help channel talent back into the local community.

Engage and Activate Leadership

Leadership in academia is an essential and powerful tool when it comes to ascribing recognition and credibility to a nascent field of study, as well as helping direct greater resources toward programming. Current practitioners of public interest technology programs at colleges and universities should strive to further engage their leadership by igniting excitement and interest

around the tremendous possibilities for good in applying technological innovation to public service. Additionally, practitioners must demonstrate the current urgency associated with bringing a public policy education into the twenty-first century to address the rapidly evolving problems of tomorrow.

As indicated in the box below, one potential approach that college and university leaders could consider to formalize and grow the field of study around public interest technology is signing on to a pledge of basic principles. Described in more detail below, principles could focus on enhancing public awareness and prestige around public interest technology and its value proposition, along with augmenting college and university practices to make administrative space for expanding the work.

A Potential Pledge for College and University Leaders

Interviewees agreed almost unanimously that support from college and university leaders was essential for public interest technology to grow and thrive. As part of establishing a community of practice, a shared declaration of principles and commitments could be a useful tool. Four elements of such a pledge could be:

Recognize the Importance of Public Interest Technology: The first commitment is perhaps the most important: to join a shared declaration that public interest technology is a vital priority in the twenty-first century, for society as a whole and higher education specifically. Using a shared language to describe the discipline could help build a common vision and raise public awareness.

Champion Public Interest Technology Opportunities: Another commitment could be to inventory, market, and build awareness around key areas of public interest technology programming and career development to students and faculty. Actively connecting interested students and faculty to experiential opportunities for expanding their academic and professional development in public interest technology will in turn make these opportunities visible to future students with new and emerging interests in the field.

Break Down Siloes: A third commitment could be to incentivize the breaking down of siloes across departments to support interdisciplinary opportunities in public interest technology programming. By prioritizing and rewarding—either financially or otherwise—collaboration by departments across disciplines, college and university leadership can incentivize departments once hesitant to look outside of their own area of study to pursue new and exciting opportunities for cross-disciplinary education and research.

Dedicate Funding: College and university leadership could commit to directing dedicated funding to public interest technology programming. This pool of funding could support scholarships, research, study, events, professional exploration, or other activities as appropriate to each institution's priorities.

In addition to agreeing to the above, the below list provides several potential interventions that academic leadership could employ for generating excitement and interest in public interest technology:

- **Sign and Promote Public Interest Technology Pledge:** Leaders could jointly sign the above pledge of principles, and, in addition to implementing them at their colleges and universities, promote the principles publicly in a series of op-eds, events, and potential broadcast appearances.

- **Establish Linkages to Current Events and Community Movements:** One potential avenue could be better connecting the discipline to real-world examples, such as current highly publicized urban policy shifts toward civic tech-related work. Elevating linkages between public interest technology theory and the ability to provide innovative support to a university's immediate community could help make a tangible case to university leadership for the benefits of long-term institutional integration.

- **Tap Tech Leadership to Champion Public Interest Technology:** Bringing high-level tech sector executives to evangelize around public interest technology could also help signify its importance to university leadership. This could be achieved through speaker series, guest lecturers, and the hosting of professional conferences and panels at individual colleges and universities. Topics could include conveying the ways in which technical skills and thinking can be invaluable to non-technical careers.

By linking programming to current and local issues, as well as leading experts in the tech sector, public interest technology could be made more tangible and palatable for university leaders to understand and support. A critical mass of engaged and activated university leaders undertaking a set of common commitments and understandings can unify a cohesive community of practice, and help to further standardize an understanding of this field both within academia and broadly, lending it greater credibility and prestige.

Use Creative Approaches for Increasing Targeted and General Support Funding

> **"Much of the current collaboration happening is between universities that share common funders. More money centered around a consortium of universities could help to bring the field together in a stronger way."**
>
> *— R. David Edelman, MIT*

Colleges and universities support some of their public interest technology programming through grants made by foundations, technology companies, and high-net-worth individuals; however, much more is required to expand the pipeline. As programs continue to explore new and creative ways to secure funding where possible, they should think strategically about how to tap into existing university funding or attract new funding. This can help to provide sustainable support for fellowships, student projects, and other infrastructure around organizing public interest technology programming at colleges and universities.

Interested university leaders and professors could consider the following interventions for improving targeted and general support funding for public interest technology programs.

- **Pursue Possible Linkages to Adjacent Funding Within Colleges and Universities:** One strategy for unleashing greater funding is to find linkages to adjacent programs at colleges and universities. For example, some colleges and universities hold large-scale funding allotments in a variety of STEM fields like data and computer science. Susan Crawford of Harvard Law School, in describing this, stated, "Harvard has huge interest in data science

right now, and just received tons of money from Bloomberg to train mayors. As of right now, these pieces are not being put together. This could be an opportunity." Finding ways to strategically integrate public-interest-related programming into efforts that tap into that funding could build public interest technology into a field of study at a university.

- **Explore New Channels for Funding**: Colleges and universities should consider new and innovative means for attracting and structuring funding for programs. While some large tech companies have given small grants in support of public interest technology-related programming, a larger commitment could be transformative. As these companies structure giving through their corporate social responsibility apparatuses, public interest technology could be a well-aligned avenue for deeper future engagement. Additionally, a collaborative funding entity could be established to provide targeted funding for public interest technology programming at colleges and universities. Further research could identify the precise optimal structure of a funding collaborative, as well as what it could fund, including scaling promising programmatic models, scholarships, and research grants.

- **Pursue Dedicated Funding for Innovative Interdisciplinary Programming**: Institutions should work to budget dedicated tracks of funding that allow faculty to pursue building innovative programming that integrates multiple disciplines. A competitive application process for said funding could provide an increased incentive for young, intrepid faculty to step outside of a departmental silo to pursue the development of more innovative academic resources for students.

In addition, some scholars identified funding as a mechanism for promoting collaboration. Having a shared funder or funding source across colleges and universities made those institutions more likely to communicate regularly. Shared funding provides an anchor by which common goals, expectations, and principles can be agreed upon. Using a community of practice as an anchor for cross-university funding in this space could help to both drive targeted funding and support an ongoing interconnected community of practice.

Uplift Models and Best Practices as Tools to Promote Effective Replication of College and University Programs

> **"We are at a point where there is incredible enthusiasm for this field, but not a lot of models for successfully executing it. We need to quickly convert this enthusiasm into tangibles."**
>
> *— Jeremy Weinstein, Stanford University*

Due to the relative youth of the current field of public interest technology programming at colleges and universities, developing a corpus of models and accompanying evidence for their potential replication could be an important resource for expanding the work more broadly. Many of the current models for executing successful programming were seen as insufficient in providing a useful, standardized roadmap. As Jeremy Weinstein of Stanford University put it, "We are at a point where there is incredible enthusiasm for this field, but not a lot of models for successfully executing it. We need to quickly convert this enthusiasm into tangibles. This will require trying many things at different places until we have a critical mass of proven best practices."

Some interviewees suggested that structural models for designing a program, as well as funding models for adequately supporting a program, would both be of particular use. Deriving models from current practices will help to determine what has worked and what has not, allowing crucial lessons from the field to emerge and to be shared with interested

institutions nationwide. Creating a critical mass of trials, successes, errors, and lessons learned will help build a comprehensive and evidence-based framework for properly building and maintaining public interest technology programming.

Some potential approaches for better uplifting models and best practices across colleges and universities includes:

- **Create an Interactive Web Portal for Knowledge-Sharing and Best Practices**: A comprehensive, online web portal could be developed that college and university leaders, scholars, practitioners, and other stakeholders could use to access and share open source information across the field. This could involve detailed descriptions of existing programs and classes, case studies, sample curricula and syllabi, an aggregation of professional and career development opportunities, and strategies for funding and administering effective public interest technology programming.
- **Develop and Share Helpful Funding Models for Sustainable Programming**: Clearly distilling and making available evidence-based successful models for funding and sustainable programming could help new, emerging, and existing public interest technology programs to further grow and succeed. This would involve an ongoing, close study of current efforts, potentially by a third party entity. Findings could be published regularly and disseminated through an interactive web portal or other medium.
- **Create Roadmap to Administering Interdepartmental Program Development**: Based on existing efforts and known models for successful programming, a roadmap that draws on direct or tangential examples of interdepartmental collaboration could be developed. This tool would help provide a standardized, evidence-based pathway for programs to develop a successful public interest technology program out of existing institutional and departmental resources at their college or university.

CONCLUSION

This document is intended as a platform for discussion and planning. It seeks to anchor what should become an ongoing conversation and collaboration among institutions, scholars, students, and communities—and between "technologists" and those who do not see themselves as such. It hopes to provide a useful tool with which professors and provosts, students and nonprofits, philanthropies and governments can develop a sustainable ecosystem that brings twenty-first century solutions to bear on twenty-first century problems. The forward-looking scholars who contributed to this report have already begun pioneering innovative curricula and opportunities to deliver measurable successes to their students, their institutions, and their communities. The task now falls to academic leadership, faculty, funders, and employers to seize on the tremendous potential of this work.

The unique opportunity of this moment is to provide students with a new vision for how they can impact the world, and new opportunities to chart their own paths within it. Students have both the desire and the ability to re-shape their communities. Academic leadership and practitioners must now match that ambition with possibility, and to champion the leaders who would build a better world.

APPENDIX: SAMPLE PROGRAM PROFILES

Provided below are descriptions of the individual programs explored in the report above. In addition, a series of additional programs discovered during desk research with relevant approaches or that added potential context are included here. These profiles are not intended to provide a conclusive landscape of all college and university programming, but rather are provided to lift up select examples for additional context.

Each of the institutions profiled in brief here is conducting existing cross-disciplinary programming around public interest technology. Profiles range from Ivy League and private institutions to state colleges and universities. Programs range from entire departments offering undergraduate, graduate, and doctoral education to smaller, non-degree certificate programs. Programs are presented in alphabetical order.

Arizona State University

The School for the Future of Innovation in Society at Arizona State University provides undergraduate and graduate programs.

The graduate program offers a Ph.D. in Human and Social Dimensions of Science and Technology (HSD) that aims to understand "socio-technical problems" by understanding how the civic and public sector interact with science and technology.[6]

The graduate certificate program in Responsible Innovation in Science, Engineering, and Society (RISES) is intended for a variety of students and professionals—from scientists, engineers, and technology officers to public administrations and policy officials—working to apply STEM skills and solutions to address twenty-first century challenges.[7]

The undergraduate program aims to help students lead in building societies that are more inclusive by linking "innovation with social needs and values." This is achieved through a multidisciplinary approach that draws on research and theory in the social sciences, humanities, natural sciences, and engineering to better analyze emerging challenges at the local, state, national, and global level.[8]

The Master's Science and Technology Policy (MSTP) requires all students to participate in the Science and Technology Policy Workshop in Washington, D.C. The course brings students to the nation's capital to engage with high-level individuals from the science and technology policy space in order to get hands-on experience with policymaking.[9]

Carnegie Mellon University (CMU)

The Department of Engineering and Public Policy (EPP) aims to solve problems at the intersection of technology and society through a series of undergraduate double majors, a Master's degree in Engineering & Technology Innovation Management, and a Ph.D. program. The department supports several key focus areas, including energy systems; climate and environment; technology innovation policy; risk analysis; and information and communication technology.[10]

The department engages in policy-focused research, which takes a longer-term, more fundamental approach to understanding policy implications with a lens for potential analytical tools and techniques suitable for addressing problems.[11] The program has developed a suite of sophisticated tools for policy analysis and research. Examples include a tool that educates users on low-carbon technologies and models potential environmental outcomes of energy generation policy, and a computer model that analyzes the cost and performance of emission control equipment at power plants using coal.[12]

The department provides students interdisciplinary opportunities through partnerships with other departments and research centers at CMU, including the Center for Computational Analysis of Social and Organization Systems; the Green Design Institute; the Behavior, Decision, and Policy Working Group; and resources in computer-based tools for quantitative policy analysis.[13]

Georgia Institute of Technology (Georgia Tech)

Georgia Tech's College of Computing offers a number of resources and learning opportunities to pair technical skills and education with social problems. Research and projects by faculty include projects in networking services and mobile wireless networking.[14]

A key initiative through the College of Computing is Computing For Good (C4G). This program aims to "leverage computing to study and address pressing societal problems." The program empowers students to apply their technical expertise and education to solve important challenges in a range of fields, including health, disaster relief, homelessness, and education, all at the local and global level.[15]

Example projects include working with the Carter Center to develop a mental health indicator data collection system in Liberia to support its nationally understaffed resources; working with the Institute for Computing Education to bring innovative computing technology, such as wearables, into K-12 classrooms; and conceptualizing and designing an online knowledge management platform for early childhood development and HIV/AIDS prevention for practitioners globally.[16]

Georgetown University

The McCourt School of Public Policy at Georgetown offers a Master of Science in Data Science for Public Policy (MS-DSPP). The program is a joint degree program between the McCourt School and Georgetown's Graduate Analytics program. It provides a course of study at "the intersection of data science and quantitative public policy analysis" that combines both a public policy analysis curriculum with leading methods in computational, mathematical, and statistical analysis.[17]

Graduates from the program have gone onto careers in the public and nonprofit sector, including the City of Baltimore, the Urban Institute, the Brookings Institution, the U.S. Department of Health and Human Services, the Department of Transportation, and the U.S. Digital Service at the White House.[18] Students have earned internships at leading financial institutions, consulting firms, and technology companies, including Amazon, Booz Allen Hamilton, and Capital One.[19]

Georgetown University Law Center runs the Institute for Technology Law & Policy. The institute aims to educate future lawyers with the knowledge and expertise necessary to address emerging legal challenges around technology policy.[20] Launched in September 2017, the Tech Scholars program provides two year-long seminars dedicated to a focus on technology policy, and connects scholars to organizations and institutions at the forefront of technology policy.[21] The law school also runs a program in partnership with the Massachusetts Institute of Technology (MIT) to create a practicum around privacy. This practicum convenes MIT technologists with law students at Georgetown to work collaboratively on projects related to major problems and challenges—both legal and technical—related to privacy law.[22]

Harvard University

The initiative digitalHKS is a part of the Harvard Kennedy School of Government, and acts as a conduit between the school's varied programming around issues and instruction at the intersect of public policy, social change, and technology. In this capacity, the initiative aims to ground contemporary social, economic, and political challenges in a twenty-first century context, addressing the unique and pressing problems of a rapidly digital society. The initiative uses curriculum, community-based programs, and innovative thinking in digital technology to educate prospective leaders in the future of government, technology, and economics and regulatory policy.[23]

The program is organized into three key topic areas: digital transformation, human rights in the digital age, and platform regulation. A sample of recent course offerings include Technology, Privacy, and the Trans-National Nature of Internet;[24] Future Issues in Cyber-Policy;[25] and Digital Government: Technology, Policy, and Public Service Innovation.[26]

digitalHKS offers a number of formal and informal counseling and career development advising services between staff and students, and invites students to serve as research assistants with the program. It connects students to affiliate practitioners in the field to learn more about the application of technology skills within the public and nonprofit sector. Examples include high-level individuals at organizations like New America, GitHub, and with public institutions like the City of Boston and New York Public Library.[27]

The program provides fellowships, both visiting and residential, to experts across government, civil society, and the technology sector to conduct further research and thought leadership in their respective fields.[28] The program also helps to provide executive education resources to existing professionals. In 2018, a session titled "Digital Transformation in Government: Innovating Public Policy & Service" will be taught over a week-long period. Taught by Harvard staff and expert practitioners, the course will provide tools and training on how to manage public agencies and civic organizations in the digital age.[29]

Massachusetts Institute of Technology (MIT)

MIT runs the Internet Policy Research Initiative (IPRI) at the MIT Computer Science and Artificial Intelligence Lab (CSAIL). The initiative is funded in part by the Hewlett Foundation, Ford Foundation, and National Science Foundation. Its mission is to work collaboratively with policymakers and technologists alike to "increase the trustworthiness and effectiveness of interconnected digital systems." The initiative achieves this by combining research, education, and engagement across engineering and public policy led by faculty in engineering, social science, and management.

IPRI has several main focus areas for its research: security, privacy, networks, critical infrastructure, machine understanding, decentralized web, and internet experience. The initiative provides a range of courses with the goal of building a "pipeline of students with training in both technical underpinnings of internet technology

and experience in the public policy environment to enter academic, commercial, government, and civil society leadership positions on internet policy."[30]

In 2017, IPRI awarded $1.5 million to researchers at the university working on projects related to internet policy and cybersecurity. The rewards were given to projects with an interdisciplinary focus that spanned academic departments. Examples of rewarded projects include a playbook on critical infrastructure security, tools and methods for understanding systemic cybersecurity risk, and a framework for using public data to support smart cities in India.[31]

Miami Dade College

Miami Dade College (MDC) is a state college located in Dade County in Miami, Florida. It is one of the largest institutions of higher education in the country.

Across its eight campuses, MDC offers students a number of opportunities to apply technical skills and learning to civic leadership in their local community. The Institute for Civic Engagement and Democracy serves as a hub for education around public policy and service. Miami Dade College is a designated Ashoka Changemaker Campus aiming to promote social innovation and design-thinking in addressing twenty-first century challenges.[32] Through the college's Earth Ethics Institute, students interested in environmental studies can explore and engage in addressing existing environmental challenges in urban communities.[33]

For technical students, MDC offers a number of private sector partnerships for students interested in hands-on application of their skills. Students have the opportunity to build teams within the school to perform a variety of service initiatives for community. Past opportunities have included working on literacy programs and in internships through the Mayor's office and with other public officials. Students have also submitted designs and ideas to the Miami Foundation's Public Space Challenge to make the city more pedestrian-friendly and to improve transportation systems.

MDC has also engaged in partnerships with other colleges and universities and entities to support technical education programming. Along with providing access to a computer science course through Harvard University,[34] the college has also partnered with McKinsey Social Initiative in hosting its Generation training programs for students interested in careers in information technology.[35]

Princeton University

Princeton University offers a number of opportunities for learning at the intersection of policy and technology. The Keller Center for Innovation in Engineering Education, based out of Princeton's School of Engineering and Applied Sciences, focuses on educating leaders "for a technology-driven society" with a focus on "entrepreneurship, innovation, and design."[36]

Princeton operates the Center for Information Technology Policy (CITP) as an interdisciplinary center merging education in technology, engineering, public policy, and the social sciences. The center supports resources such as research, teaching, and on-campus events that examine how technology and digital innovation are being applied to societal problems.[37]

Along with year-round undergraduate and graduate courses, the center provides undergraduate students the opportunity to earn an undergraduate certificate in partnership with the Keller Center through the Program in Technology and Society, Information Technology Track. This track aims to help students "better understand how technology drives social change, how society shapes technology, and how technologies can be used to address grand social challenges."

The center provides funding for undergraduate and graduate internships. Students can apply to scholarships to fund internships, as well as summer

research.[38] Additionally, students can apply to partake in the annual Tech Policy Boot Camp Trip in Washington, D.C. The boot camp is a three-day all expenses paid trip where students can visit with organizations working in technology policy, meeting alums and participating in substantive discussions.[39]

SUNY Stony Brook University

The Department of Technology and Society (T&S) merges learning and skills from the natural sciences, engineering, and social sciences and applies them to better understand the relationship between technology and our society. T&S has moved to focus on energy-environmental systems, and engineering & technology workforce policy.[40]

T&S offers a Ph.D. in Technology, Policy and Innovation; an M.S. in Technological Systems Management; and a B.S. in Technological Systems Management. Focus areas include educational technology, global technology management, energy and environmental systems, and energy, technology, and policy. Each of these programs culminates in either a masters project or an advanced technology assessment, some of which require prerequisites in statistics and computer programming.[41]

Professionals can also obtain advanced graduate certificates. K-12 teachers, both current and prospective, can earn a certificate in educational computing to better understand how to integrate advanced technologies into the classroom. Likewise, career managers can earn a certificate in industrial management to understand how to apply advanced technologies to the processes and functions at companies to combat inefficiencies.[42]

The program also offers minors in Nanotechnology Studies (NTS).[43] Research interests for the department include environmental and waste management, climate, how technology impacts inequality and poverty, distance learning, and planning and managing educational technologies.[44]

University of California at Berkeley

Located within the School of Information, Berkeley's Center for Technology, Society, and Policy (CTSP) is a research center that supports the exploration, designing, and building of multidisciplinary approaches to addressing pressing policy challenges related to technology.

CTSP covers four key areas of focus: Sensors & Society, which is concerned with the privacy and ethics of the growing internet of things (IoT) such as audio/video and surveillance; Democracy + Technology, which examines the function of everyday governance, including media and news, online censorship, and free speech; Vital Questions, which considers how technology plays a role in community wellness, healthcare, and physical and mental health; and Fairness & Opacity, which looks at how algorithmic decision-making and other digital tools may protect from or promote bias and discrimination.[45]

The Center sponsors an Un-Pitch Day inviting nonprofit and community organizations to pitch their most pressing technology challenges. These organizations can then be paired with graduate student project groups able to apply their technical expertise to solve the problem. This collaborative engagement allows students to gain invaluable experience while providing a useful service to organizations and the local community broadly.[46]

The center runs a fellowship program consisting of graduate and undergraduate students. The center allows proposals for collaborative projects from either small teams or individuals. Teams of fellows will be funded $2,000 per team member to conduct their project in their area of focus for one year. Project scopes can include white papers, regulatory proposals, public events, or engineering prototypes. Projects can be either independent or done in partnership with a sponsoring nonprofit organization or government agency.[47]

University of Chicago

The University of Chicago Department of Computer Science offers a Master's degree in Computational Analysis and Public Policy (MSCAPP). The MSCAPP is a two-year intensive program focused on the nexus of policy analysis, statistics, and computer science. Courses are drawn from both the Harris School of Public Policy and the Computer Science department. Alums and current students laud the program for applying fundamental quantitative and computation skills to real world public problems where data still remains to be unleashed as a tool for change.[48]

In year one, students start with a set of courses in computer science, statistics, and economics. In year two, students take on courses in econometrics, data science, application development, and policy research. Elective courses can be drawn from a variety of other schools and departments at the University of Chicago, including the Toyota Technology Institute, the Booth School of Business, the economics, statistics, and social sciences departments, and the law school.[49]

The program also provides a regular workshop series lifting up the latest research and public policy innovations through data and technology, allowing students and faculty to engage in applied conversations with experts and professionals in the field. Additionally, the program runs a summer internship program which place students in positions within their field of interests at government agencies and organizations. The program provides ongoing research opportunities for students in partnership with a range of affiliate research centers at the University of Chicago.[50]

University of Maryland

The Science, Technology and Society (STS) program through the A. James Clark School of Engineering aims to explore the ways in which social, ethical, and political factors and relationships influence and promote research and innovation. This certificate program's goal is "to give students analytical skills that help connect science and technology to broader social needs."[51]

While the program is housed at the school of engineering, non-engineering majors make up a significant portion of program participants. The program applies a focus on using interdisciplinary strategies for problem solving and creatively developing new technologies and approaches with an ethical and social lens.[52]

STS operates the College Park STS program for undergraduate freshman and sophomores to help emerging science and engineering students to think holistically about the societal implications of their study.[53] The program uses an active learning approach, taking students on field trips to places like NASA, the U.S. Patent and Trademark Office, and the National Building Museum to further explore these key themes in a hands-on environment.[54]

The College Park STS program offers students service learning opportunities in the community, volunteering at events and conferences such as Maryland Robotics Day or the Center for Social Value Creation's annual Social Enterprise Symposium. It also gives students the opportunity to work on projects in three key areas: robotics service learning, infrastructure and society, and sustainability and design.[55]

University of Michigan

The School of Information at the University of Michigan runs the Citizen Interaction Design program to instruct on how to apply information tools traditionally used to transform industry to local government and civil society. Students learn how to design innovative information tools to generate civic engagement in local government. The program supports summer internships in local Michigan government, and promotes speaker series and conferences.[56]

The Gerald R. Ford School of Public Policy runs the Science, Technology, and Public Policy (STPP) Graduate Certificate Program, which allows students to examine and understand the relationship between politics and policy and science and technology. Students learn how to address complex public policy challenges related to science and technology, including biotechnology, information and communications technology, and energy policy.[57]

Graduates of the program have gone onto careers in national and global government agencies, such as Congress, European Parliament, USDA, and the Indian Council for Medical Research, as well as NGOs, philanthropy, and advocacy groups. [58]

University of Virginia

The Department of Engineering and Society provides undergraduate and graduate education opportunities for students to "confront the difficult challenges of the twenty-first century."[59] The Science, Technology & Society program works with undergraduate engineers to equip them with the social, political, and ethical tools to promote transformative technology through research and critical thinking. The program is housed at the School of Engineering and Applied Sciences (SEAS), allowing it to properly integrate a "deep understanding of technology with broad perspectives about society and culture."[60]

The university notes that its graduate engineering students earn positions across sectors, from universities and private industry to government research and consulting. According to data provided by SEAS, approximately 14 percent of graduates go onto careers in government.[61]

SEAS provides career development opportunities to undergraduate students through the Science and Technology Policy Internship Program. The program places students in internships with Congress, government agencies, and civic organizations in Washington, D.C. to work on science and technology policy for a 10-week period over the summer.[62]

Stanford University

Stanford University supports CS+Social Good, a student-led group interested in exploring the ways in which computer science can be applied to solve social problems and promote social impact. The organization provides students a number of opportunities to engage with issues at the intersection of technology and society.[63]

The CS+Social Good Studio is a class where students design and implement a project in partnership with a local organization to solve a social challenge. The class pairs project teams with professional mentors to provide design and technical guidance.[64] Additionally, the organization works with a class titled Using Tech For Good, which pairs over 40 students with a handful of civic organizations such as the Trevor Project, the American Red Cross, and Black Lives Matter, and invites speakers regularly to present on their work in the field.[65] The organization also hosts bi-weekly discussions and other social events.

CS+Social Good sponsors a fellowship program funding students to work full time for civic and social organizations and technology startups applying technology to advance their social impact missions.[66]

Stanford University also offers a number of courses at the intersection of technology and society: EARTHSYS 262: Data for Sustainable Development;[67] MS&E 330: Law, Order & Algorithms;[68] and ENGR 150: Data Challenge Lab, an experimental course where students develop skills in data analysis and visualization to solve real-world social problems.[69]

The Stanford Center on Poverty and Inequality runs the Stanford Poverty & Technology Lab. This lab aims to explore how the technological innovations of Silicon Valley can be used to provide creative and cost-efficient solutions to combatting domestic poverty and inequality. The lab brings together a diverse array of actors to solve problems and create services to address unemployment, access to education and training, and social services.[70]

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